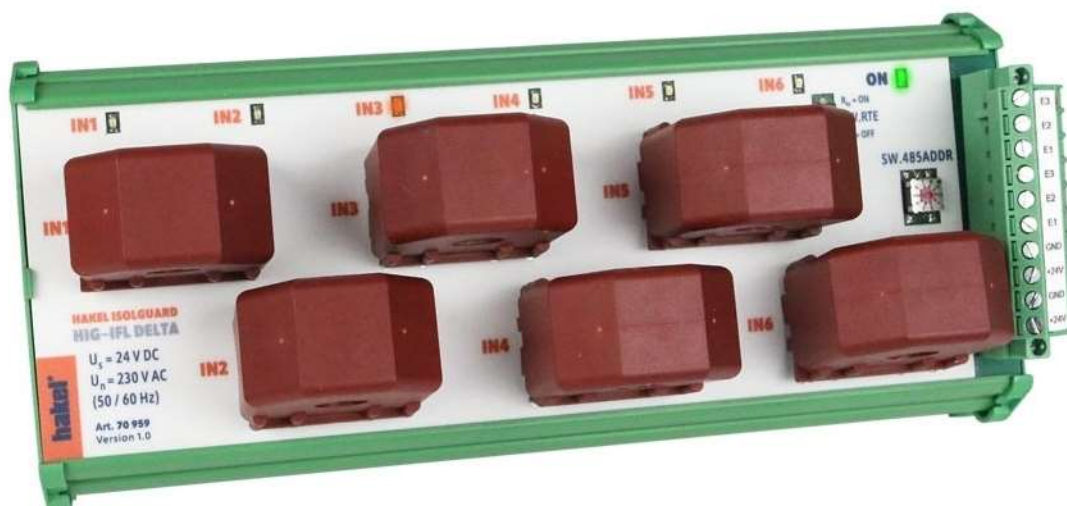


Insulation fault location module

ISOLGUARD HIG-IFL DELTA

Operating instructions



Document's name: DOK-70959-V1.0

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Used symbols



Warning, caution

This symbol informs about very important installation and operation instructions of the device or about hazardous situations that may have happened during the installation and the operation.



Information

This symbol highlights particularly important characteristics of the device.



Note

This symbol indicates useful additional information.

1. HAKEL ISOLGUARD HIG-IFL DELTA

Insulation fault location module produced by HAKEL, ISOLGUARD HIG-IFL DELTA type, is designed to identify the location of insulation fault in IT distribution power supplies, mainly in healthcare IT systems.

The HIG-IFL DELTA is equipped with six measuring transformers (LCS, *Locating Current Sensor*, according to IEC 61557-9), which are part of the product, and enables localization of faults on up to six circuits of the IT power supply system. It is designed for measuring IT power supply systems of the AC type, but mainly for single-phase AC systems, designed according to the standard HD 60364-7-710:2012 (Medical Isolated System - MIS).

The module is supplied with a low voltage of 24 V DC and it is connected to the HAKEL HIG95-DELTA insulation monitoring device by *HAKEL IFLS* bus. Both devices form together a system for fault location (IFLS, *Insulation Fault Location System*). HIG95-DELTA device contains locating current injector (LCI, *Locating Current Injector*).

Up to 10 HIG-IFL DELTA modules can be connected to a single insulation monitoring device to monitor up to 60 circuits. The signalling of the monitored circuits' status is performed by LED diodes on the module, on the insulation monitoring device's display and by the master monitoring system (MDS-D remote monitoring module).

HIG-IFL DELTA insulation fault location module

Type	Number of localization circuits	Measuring transformers	Compatible with	Supply voltage	Assembling	Width
HIG-IFL DELTA	6	integrated	HAKEL ISOLGUARD HIG95-DELTA	24 V DC	On 35 DIN rail	12 M
Art. no.: 70 959						

Table 1: Type and article number

1.1 Basic characteristics

HIG-IFL DELTA insulation fault location module complies with standards:

- IEC 61557-9:2014 Equipment for insulation fault location in IT systems
- IEC 61557-1:2007 Equipment for testing, measuring or monitoring of protective measures
- IEC 60664-1:2007 Insulation coordination for equipment within low-voltage systems
- IEC 61326-2-4:2012 Electrical equipment for measurement, control and laboratory use - EMC requirements
- IEC 60068-2-6 Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)
- IEC 60068-2-27 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock

HIG-IFL DELTA basic characteristics

- Insulation Fault Locator (IFL) according to IEC 61557-9 for single-phase AC systems with nominal voltage U_n 230 V AC with frequency 50 / 60 Hz.
- Maximal operating voltage 275 V AC.
- Form the system for fault location (IFLS) together with HIG95-DELTA insulation monitoring device.
- HIG-IFL DELTA is equipped with six measuring transformers, which are part of the product, and enables localization of faults on up to six circuits.
- Possibility of setting the user name for individual circuits, either through the insulation monitoring device or a PC computer.
- Connection to the HIG95-DELTA device using the *HAKEL IFLS* bus.
- Up to 10 HIG-IFL DELTA modules can be connected to a single insulation monitoring device.
- Direct signalling of monitored circuits status by LED diodes on the module.
- Remote monitoring of monitored circuits status on the device display and also on the MDS-D remote monitoring module.
- The module is supplied from 24 V DC independent source.
- 12M (210 mm) module wide for DIN 35 rail assembly.
- HIG95-DELTA device description and its connection to the location module is listed in separate documentation. Documentation designation is "*HIG95-DELTA Operating instruction.*", documentation number is "DOK-70940-V1.4".

Ed. 12. 06. 2020

2. Technical characteristics

Type		ISOLGUARD HIG-IFL DELTA
Monitored IT power supply system type		AC
Monitored IT power supply voltage	U_n	230 V AC (50 / 60 Hz)
Maximal IT power supply operational voltage		275 V AC
Nominal supply voltage	U_s	24 V DC
Supply voltage range		9 ÷ 36 V DC
Power consumption	P	max. 1,5 VA
Measuring circuit		
Number of measuring inputs		6
Total possible number of inputs		60
Max. locating voltage value	U_L	24 V _~
Max. locating current value	I_L	< 0,5 mA
Response sensitivity		50 µA
Measurement accuracy		±30 %
Outputs		
Communication line		<i>HAKEL IFLS bus</i>
Insulating strength to the internal circuits and to the network circuits		2500 Vrms

Table 2: Technical characteristics HIG-IFL DELTA, part 1

General data		HIG-IFL DELTA
Degree of protection provided by the cover according to IEC 60529		IP20 Module without front panel
Weight	m	630 g
Housing material		PA - UL 94 V0
Method of assembly		35 DIN rail
Recommended section of the connected conductors	S	1 mm ²
Recommended protection		6 A
SW version		1.0
Article number		70 959

Table 3: Technical characteristics HIG-IFL DELTA, part 2

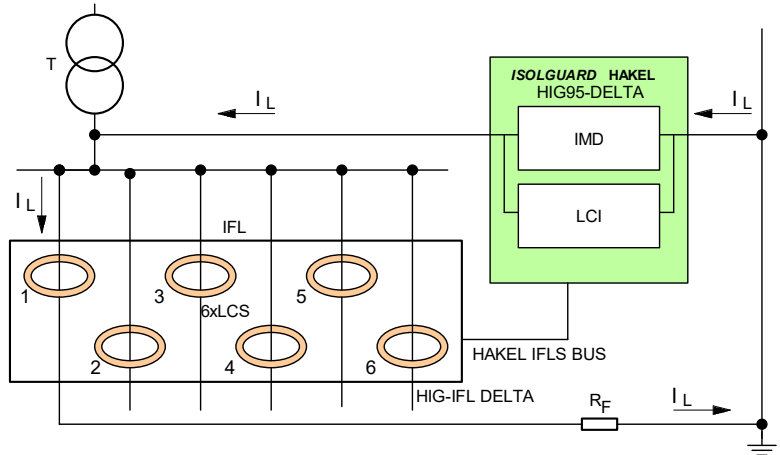
Operating conditions	HIG-IFL DELTA
Operating temperature	-15 °C ÷ +70 °C
Storage temperature	-25 °C ÷ +70 °C
Shipping temperature	-25 °C ÷ +70 °C
Altitude	Up to 2000 m a. s. l.
Working position	any
Protection class	II according to IEC 61140:2016
Overvoltage category	III according to IEC 60664-1:2007
Pollution degree	2 according to IEC 60664-1:2007
Operation type	permanent

Table 4: Technical characteristics HIG-IFL DELTA, part 3

3. HIG95 DELTA device and HIG-IFL DELTA fault location module connection

Insulation fault location module is always installed in connection with insulation monitoring device (IMD). HIG95-DELTA device is intended for HIG-IFL DELTA module. Both devices form together a system for fault location (IFLS). HIG95-DELTA device contains locating current injector (LCI). Locating current sensors (LCS) are part of the HIG-IFL DELTA module.

Location module is connected to the insulation monitoring device by *HAKEL IFLS* bus on "E1 E2 E3" terminals according to recommended connection, see chapter 5. Module's power supply is connected on "+24V" and "GND" terminals. Nominal power supply voltage is 24 V DC. Both terminals set on the module are doubled for possible connection of bus and to additional modules.

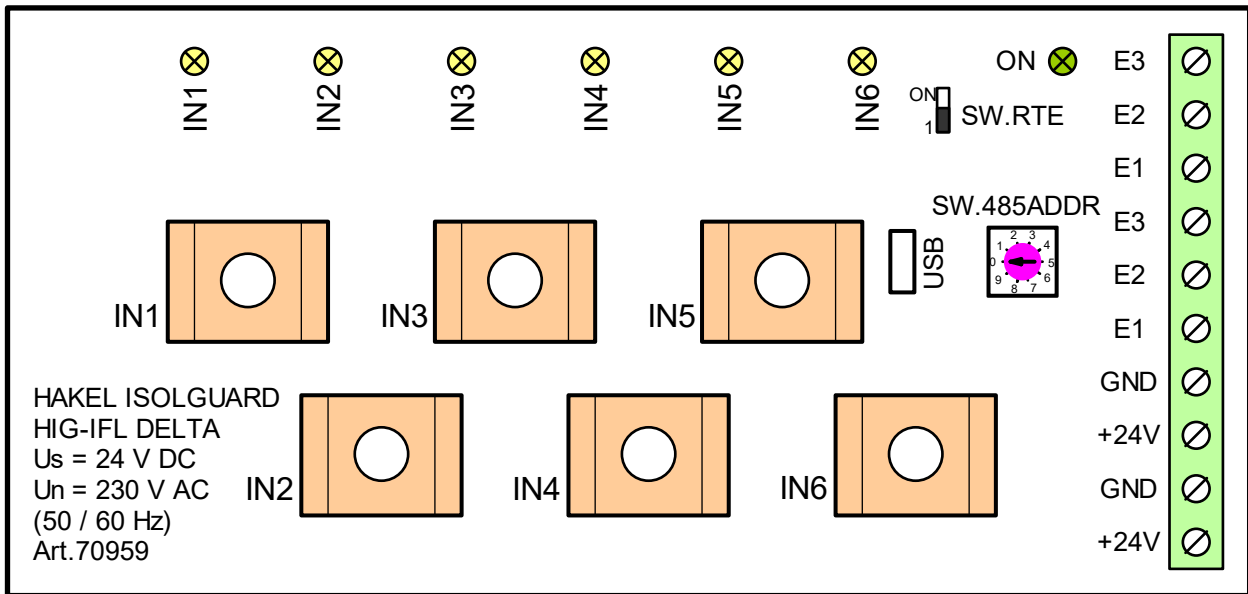


Picture 1: IFLS connection

4. HIG-IFL DELTA controls and connecting terminals

HIG-IFL DELTA fault location module is placed in a box for assembling on DIN 35 mm rail with 12M (210 mm) width.

On the module, there is: six yellow location status indicator lamps, green power supply indicator lamp, address setting switch and IFLS bus termination. There is also a connector on the module for connecting the power supply and two places for connecting the *HAKEL IFLS* bus.



Picture 2: Connection points and indicator lamps of the HIG-IFL DELTA module

4.1 Indicator lamps on the HIG-IFL DELTA location module

Green indicator lamp ON

It shines when power supply voltage is connected. It flashes slightly after starting the function of the module. Fast flashing signals localization module fault.

Yellow indicator lamps IN1 to IN6

This is how they determine fault location status of each of the six monitored circuits:

- all the yellow indicator lamps *IN1* to *IN6* are off – insulation status fault is not evaluated and fault location is not active
- all the yellow indicator lamps flash at the same time – there is no communication between the insulation monitoring device and the location module
- yellow indicator lamp *IN1* to *IN6* flashes – insulation status fault is evaluated and fault localization on the particular circuit is in progress
- yellow indicator lamp *IN1* to *IN6* constantly shines – insulation status fault was evaluated on the particular circuit

4.2 Connection spots of the HIG-IFL DELTA location module

Terminals GND, +24V

Connection of location module's power supply voltage. Nominal power supply voltage of the module is 24 V DC. Allowed voltage range on the terminals is 18 to 36 V DC. Power supply terminals are doubled.

Terminals E1 E2 E3

They are intended for connection of *HAKEL IFLS* bus between HIG95-DELTA insulation monitoring device (*E1, E2, E3* terminals) and HIG-IFL DELTA location module. Terminals are doubled for possible connection with another location module. Recommended type of bus connection cable are cables UTP type. It is necessary to use only one cable type along the whole length of the bus which ensures a uniform conductor impedance and there are no reflections when the bus is terminated correctly.

It is possible to use cables type STP/FTP for bus connection in a disturbed environment or as a protection against electromagnetic radiation. These cables also contain shielding in addition to twisted conductors. It is necessary to grounded the shielding at one point.

The connection of stations on the bus must be linear. The individual stations are interconnected consecutively without any taps. HIG95-DELTA device is always in MASTER position on *HAKEL IFLS* bus.

Sensors IN1 to IN6

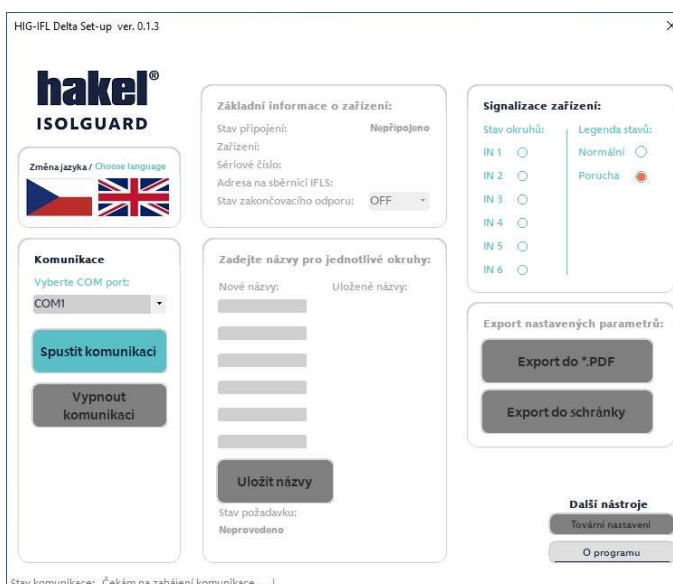
Each power supply circuit of the MIS system is connected by passing both power supplied conductors through the *IN1* to *IN6* sensor hole. *PE* conductors cannot be passing through the sensor. Insulation status of each *IN1* to *IN6* input is shown by *IN1* to *IN6* indicator lamp. Short flash means particular input monitoring. Permanent shine signals insulation status fault on that IT power supply system's part, which is supplied through sensor *INx*.

Connector USB

It is intended for location module and PC computer connection. User program "*HIG-IFL DELTA Set-Up*" (Windows 10, .NET Framework 4.5.2. and higher) is provided by the producer. This program allows settings of user's name of each location module circuit.

Connector "*micro USB B*" type is used on the location module

Program description is listed in separate documentation "*ISOLGUARD HIG-IFL DELTA Set-Up program for fault location settings*".



4.3 HIG-IFL DELTA location module adjusting elements

SW.RTE switch

It is intended to adjust *HAKEL IFLS* bus termination on the location module. 120 Ω termination resistance is connected to the bus in *ON* position. Bus is without termination in *OFF* position

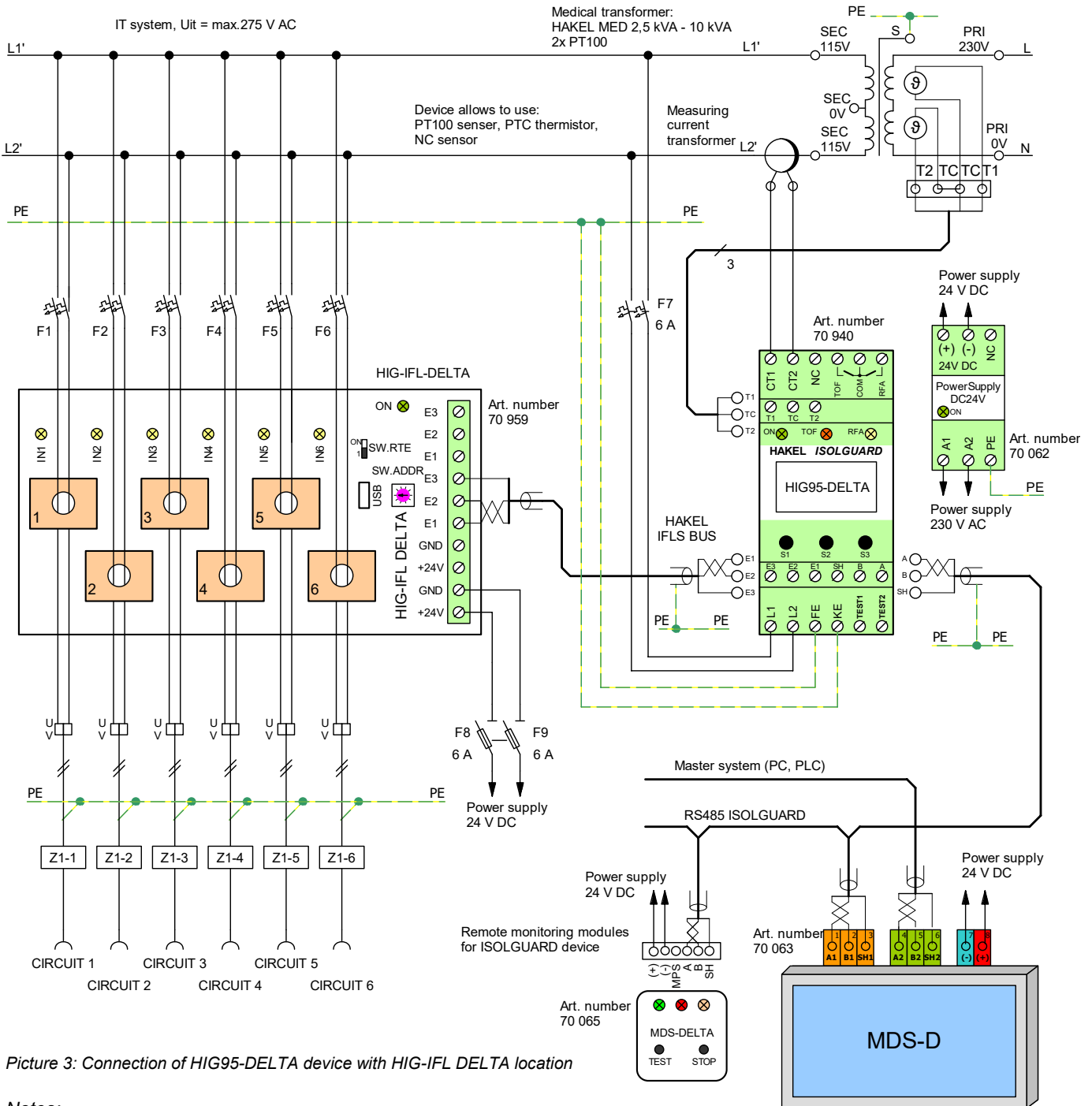
SW.485ADDR switch

IT adjusts location module address on the *HAKEL IFLS* bus. The address is adjusted in a 0 to 9 range by turning the switch. Different address must be adjusted to each module. Producer recommends adjusting addresses from 1 to the number of modules.

Adjusted address determines module number in the location status menu (*IFLS STATUS*). Module with "1" address is labelled with text "*IFL.01*" in the status report, module with "2" address with text "*IFL.02*" etc. Module with adjusted address 0 is labelled with text "*IFL.10*".

5. Recommended connection of insulation monitoring device with HIG-IFL DELTA fault location module

5.1 Connection diagram of IT power supply system with HIG95-DELTA insulation monitoring device with MDS-D and MDS-DELTA remote monitoring modules and with HIG-IFL DELTA fault location.



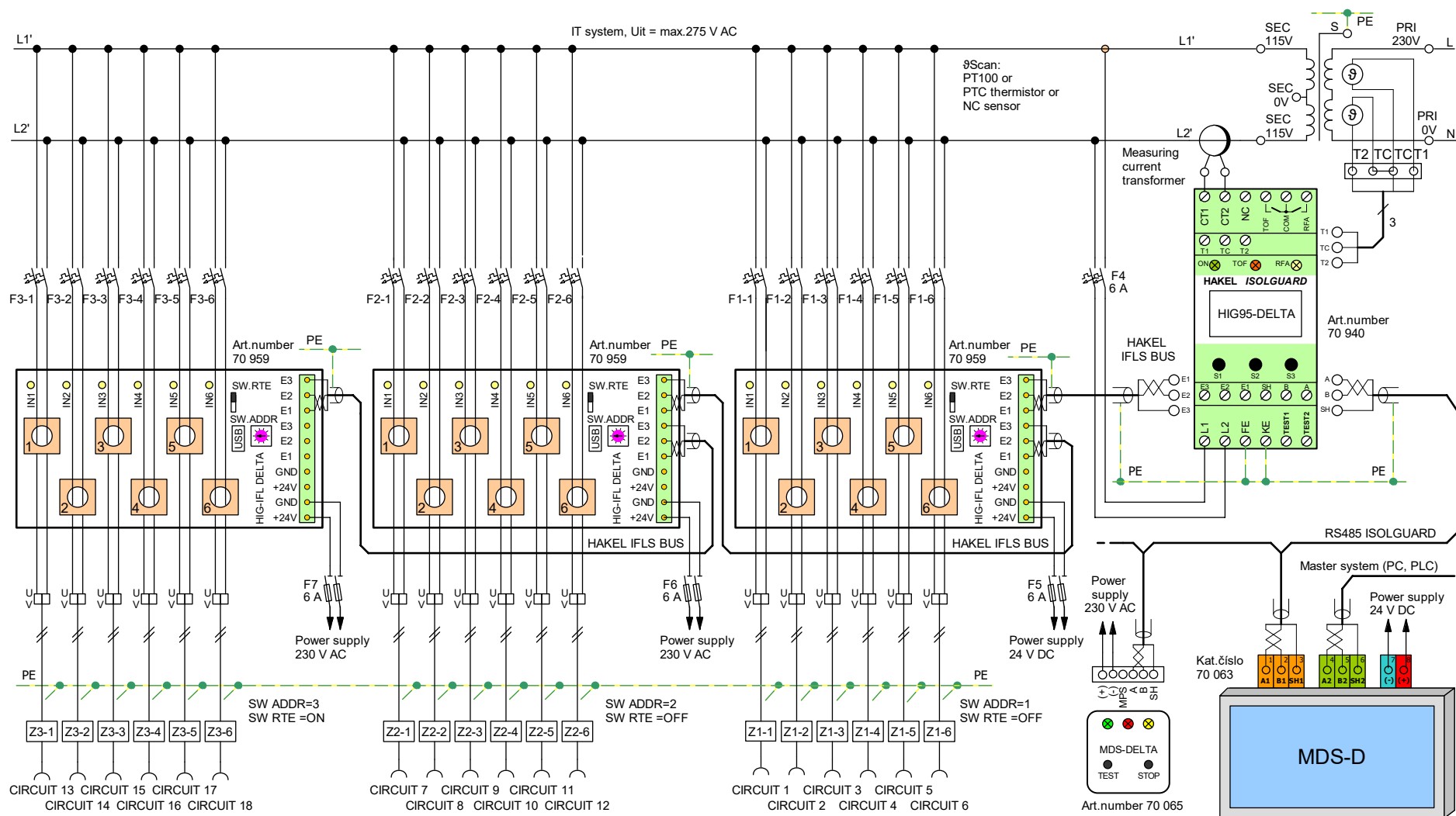
Picture 3: Connection of HIG95-DELTA device with HIG-IFL DELTA location

Notes:

1. Several MDS-DELTA modules can be connected to the device.
2. Terminals FE and KE must be connected by separate conductors to the PE bridge.
3. NC (Not Connected) this terminal should not be connected.
4. Use UTP/FTP/STP cable according to the surroundings and length for HAKEL IFLS connection.
5. Recommended types of cable for the ISOLGUARD RS485 bus are listed in the MDS-D module description.
6. When using a shielded cable for the ISOLGUARD RS485 bus, bus shielding has to be connected across the whole length and grounded at one point.
7. It is necessary to follow a linear wiring of the ISOLGUARD RS485 bus, any taps are not allowed.
8. Install only one cable type along the whole length of the bus.



5.2 Connection diagram of IT power supply system's HIG95-DELTA device with multiple location modules.



Notes:

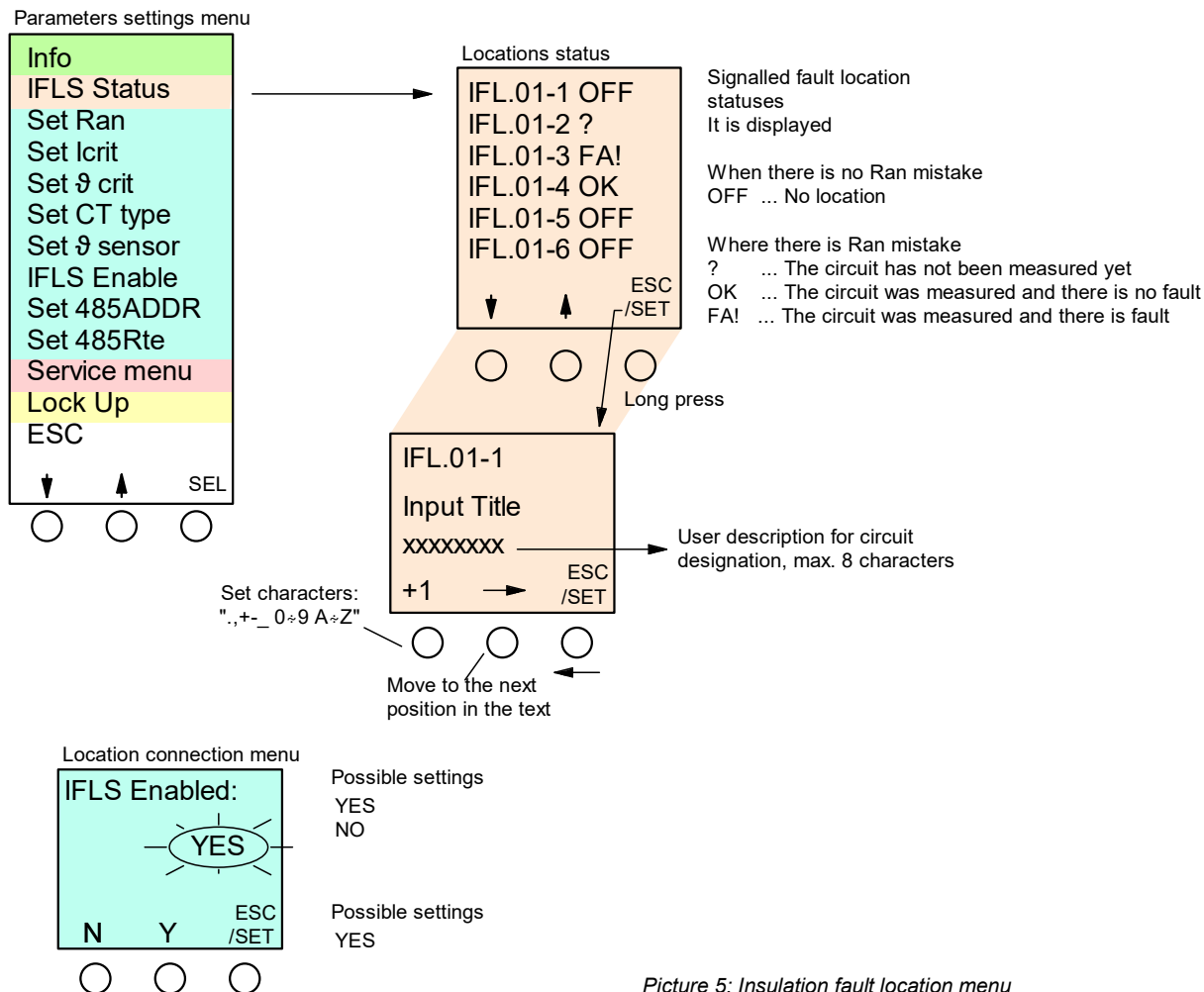
1. Terminals FE and KE must be connected by separate conductors to the PE bridge.
2. Use UTP/FTP/STP cable according to the surroundings and length for HAKEL IFLS connection.
3. It is necessary to follow a linear wiring of the ISOLGUARD RS485 bus, any taps are not allowed.
4. Install only one cable type along the whole length of the bus.

Picture 4: Connection of HIG95-DELTA device with multiple location modules

6. Insulation fault location menu

Basic settings and evaluation of HIG-IFL DELTA location status is done through HIG95-DELTA device.

There is item “Locations status” (*IFLS Status*) in device’s parameters settings menu. This item provides information about insulation fault location status.



Picture 5: Insulation fault location menu

In the menu “Location status” (*IFLS Status*) can be done:

- browsing individual monitored circuits statuses by using arrow push-buttons up and down
- individual monitored circuit status is displayed by IFL designation with *HAKEL IFLS* bus module number, with module’s input number on and with text expressing insulation fault monitoring status.
Displayed text “IFL.01-1” means circuit on the module with set address 1, input IN1.
- when the device does not signal *Ran* fault, text “OFF” is displayed
- when the device does signal *Ran* fault, text with the following meaning is displayed:
 - “?” the circuit has not been measured yet
 - “OK” ...the circuit was measured and there is no fault
 - “FA!” the circuit was measured and there is fault
- long press can select individual circuit to display user description (*Input Title*)
- user description text can be set in this menu
- character selection of the user description text is done by pressing the push-button “+1” repeatedly
- middle push-button moves the character setting position one character to the right
- character flashes on the selected position
- long press saves the entered text
- the menus are closed by a short press of the push-button *ESC*
- user description text can be simply set with “HIG-IFL DELTA Set-Up” program by PC computer and USB line, see chapter 3.

7. HIG95-DELTA parameters factory settings

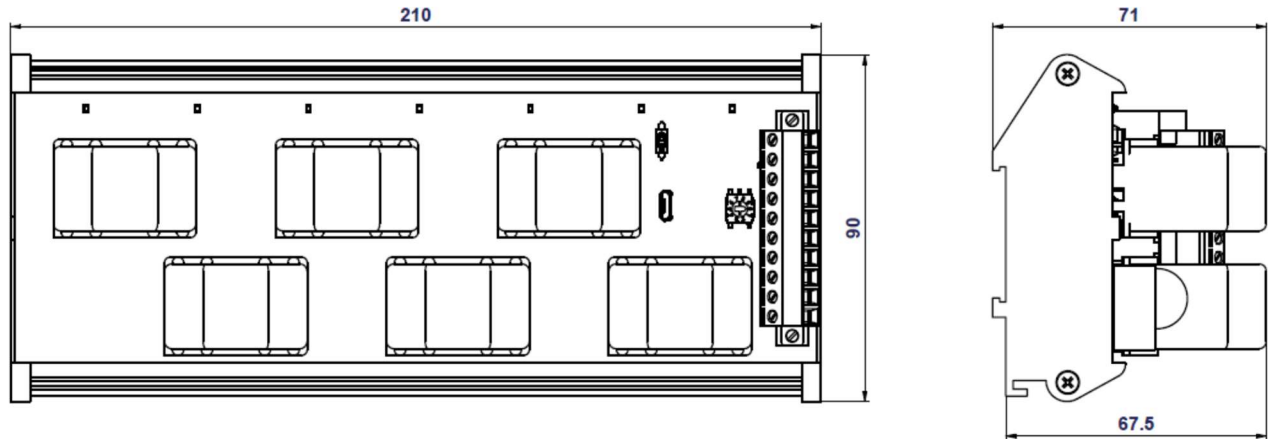
Location module's parameters are set to default values during production.

SW.485ADDR switch for address settings is set to value 1. Module with this address is labelled with text "IFL.01" in location status report.

SW.RTE switch to adjust **HAKEL IFLS** bus termination is adjust to **OFF** position. IFLS bus is without termination.



8. Device dimensions



Picture 6, Device dimensions HIG-IFL DELTA

9. Fault location module installation



Operation, installation and maintenance can be done only by qualified personnel according to assembling and safety regulations. If the device is used in the way not specified by the producer, protection provided by the device could be disrupting.

Z HIG-IFL DELTA is intended for assembling on 35 mm DIN rail according to IEC 715:1981. Any working position.

10. Maintenance and service



It is necessary to follow specified conditions for reliable operation, do not expose the device to rough handling, keep it clean and ensure maximum admissible temperature of the environment.

Only qualified personnel are allowed to install and set up the device. Only the producer provides repairs of the device. No personnel are needed to operate the insulation monitoring device. Technology service is during the operation informed by local and remote monitoring signalization about the monitored power supply and transformer status.

11. Producer

Producer of HIG-IFL DELTA insulation fault location is

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www.hakel.com*